

tangular main portion that ends in a triangular taper at the input end.

The cutout lies above a standard rectangular cavity. The combination of the triangular-taper portion of the cutout and the rectangular cavity serves to focus the electromagnetic field to propagate up the signal-line via. The cavity also prevents coupling of the signal to neighboring circuits. The rectangular cavity can be fabricated easily by con-

ventional machining techniques; the triangular-taper portion of the cutout is fabricated easily by printed-circuit techniques. To compensate for reflections from the transition, step-matching sections are included in the vicinity of the triangular taper.

Mode-strapping vias are also included. These vias are blind; that is, they terminate at, and are connected to, an intermediate layer. These vias can be

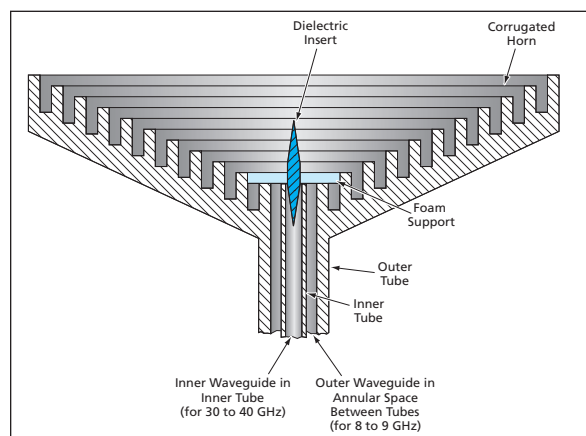
blind because they do not carry the signal. These can be closely spaced. The closeness of the spacing compensates somewhat for the unreliability of connections formed in the process of fabrication of blind vias.

*This work was done by Larry Epp and Abdur Khan of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-41061*

## Dual-Band Feed for a Microwave Reflector Antenna

Two coaxial waveguides carry radiation in two frequency bands.

NASA's Jet Propulsion Laboratory, Pasadena, California



A **Corrugated Horn** and a **Dielectric Rod Insert** help to shape the beams radiated from the ends of the outer and inner waveguide, respectively.

A waveguide feed has been designed to provide specified illumination patterns for a dual-reflector antenna in two wavelength bands: 8 to 9 GHz and 30 to 40 GHz. The feed (see figure) has a coaxial configuration: A wider circular tube surrounds a narrower circular tube that serves as a waveguide for the signals in the 30-to-40-GHz band. The annular space between the narrower and the wider tube serves as a coaxial waveguide for the

signals in the 8-to-9-GHz band. The nominal design frequencies of the outer and inner waveguides are 8.45 and 32 GHz, respectively.

Each of the two waveguides is terminated in a component that is sized and shaped to help focus the radiation in its respective frequency band into the specified illumination pattern. For the outer waveguide, the beam-shaping termination is a corrugated horn; for the inner waveguide, the beam-shaping termination is a dielectric rod insert.

*This work was done by Daniel Hoppe and Harry Reilly of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-40418*